PROC. ENTOMOL. SOC. WASH.
105(1), 2003, pp. 9–12

A NEW SPECIES OF BLACK FLY (DIPTERA: SIMULIIDAE) FROM NOVA SCOTIA

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Abstract.—The larva and pupa of a new species of black fly from the LaHave River in Nova Scotia, Canada, are described and illustrated. ***Simulium rothfelsi*, n. sp.**, is most closely related to *S. johannseni* but can be distinguished from this species and all others in North America by the configuration of the pupal gill—two swollen dorsal filaments and two slender ventral filaments. This new species is univoltine, passing the winter as eggs and completing its larval and pupal development in a few weeks during May.

Key Words: Simuliidae, *Simulium*, new species, aquatic insects, Nova Scotia

About 190 nominal species of black flies have been recorded from North America north of Mexico (Crosskey and Howard 1997, Crosskey 1999), with about 60 of these known from eastern Canada (Ontario eastward). Areas of eastern Canada that have received the most faunistic attention are Ontario and insular Newfoundland (Davies et al. 1962, McCreadie et al. 1995). The simuliid fauna of the Maritime Provinces remains incompletely studied. The last published account of the fauna, an annotated list of 20 species, appeared more than two decades ago (Lewis and Bennett 1979).

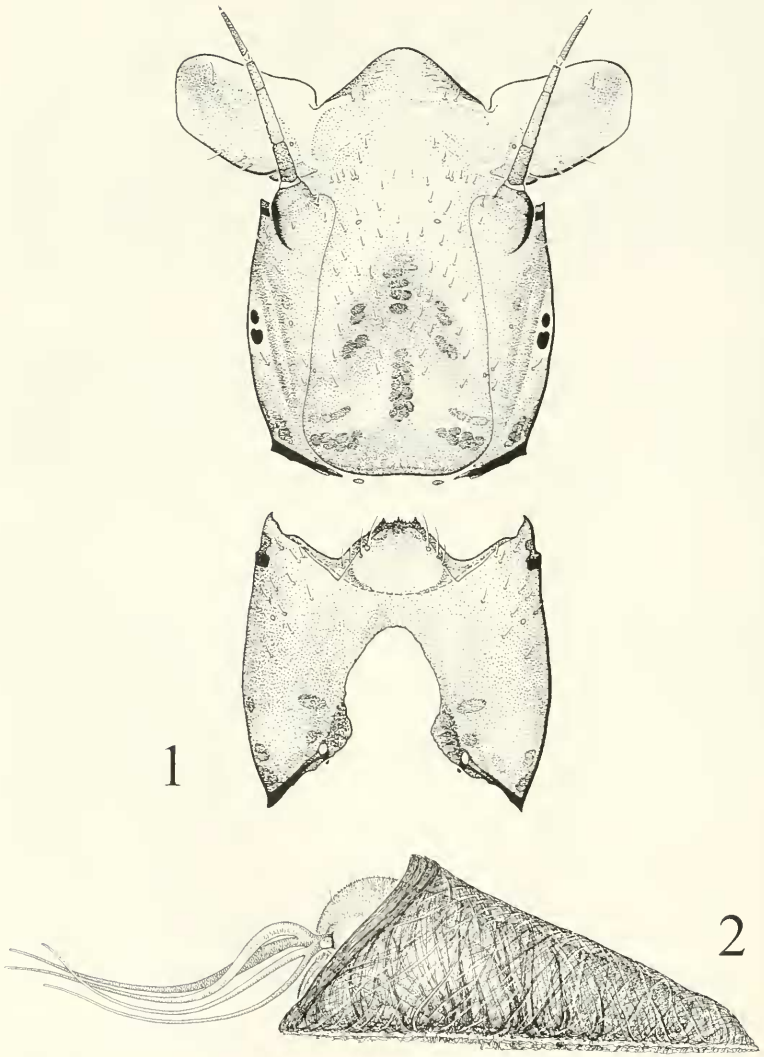
New species of black flies continue to be discovered in North America, although at a declining rate. We describe the larva and pupa of a new species from the LaHave River of Nova Scotia, Canada. The species undoubtedly has a broader range, but its rapid development—a two- to three-week period in May—probably contributed to its absence in previous studies. The adults remain unknown after eight attempts to collect them failed. The unique gill of the pupa, however, should allow adults to be reared and associated in the future.

Material was collected in Carnoy's fixative (1 part glacial acetic acid: 3 parts absolute ethanol) and transferred to 80% ethanol. Descriptive terminology follows primarily that of Peterson (1981). The holotype and some larval paratypes are deposited in the Canadian National Collection, Ottawa. Additional paratypes are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC, and the Clemson University Arthropod Collection, Clemson, SC.

Simulium rothfelsi Adler, Brockhouse, and Currie, new species

(Figs. 1–2)

Larva.—Length 5.4–5.7 mm. Head capsule (Fig. 1) pale brownish yellow, with all



Figs. 1–2. *Simulium rothfelsi*. 1, Larval head capsule, dorsal view (above), ventral view (below). 2, Pupa and cocoon, left lateral view of holotype.

head spots dark brown, bold, slightly infuscated. Antenna pale brown, extended beyond apex of stalk of labral fan by about ½ length of distal article; medial article with 3 or 4 pale hyaline bands, barely perceptible in some specimens. Hypostoma with median and lateral teeth subequal in size and extended anteriorly to about same level. Postgenal cleft extended about ¾ distance to hypostomal groove, widest at midpoint, tapered and pointed or rounded anteriorly; subesophageal ganglion typically lacking pigmented sheath. Labral fan with 48–55 primary rays. Body brownish or grayish, distinctly banded, with unpigmented intersegmental areas. Abdominal segment IX with prominent, conical ventral tubercles; abdominal setae simple, translucent, sparse. Posterior proleg with 8–10 hooks in about 60 rows. Rectal papillae of 3 compound lobes.

Pupa (Fig. 2).—Length of cocoon, in lateral view, 3.8–4.0 mm. Gill with 4 filaments, about as long as pupa; base short, about as long as wide, giving rise to 2 petiolate pairs of filaments; dorsal and ventral petioles short, subequal in length and width; dorsal pair of filaments markedly swollen; third filament from dorsum slightly swollen; ventralmost filament slender, not swollen; filaments directed anteroventrally, tapered distally, with surface wrinkled and slightly granulate proximally, and marked by transverse furrows distally. Cephalic plate smooth. Thorax dorsally with sparse, irregularly distributed, rounded microtubercles; trichomes simple. Abdomen with spine combs weakly developed on segment V, well developed on segments VI–IX. Cocoon slipper shaped, densely woven.

Types.—Holotype: pupal exuviae + cocoon in ethanol. Canada, Nova Scotia, Lunenburg Co., near New Germany, LaHave River, 44°33′N, 64°43′W, 21 May 1999, C. L. Brockhouse. Paratypes: same data as holotype, 24 May 2000 (1 pupa + cocoon, 1 pupal exuviae without cocoon); 18 May 2001 (13 larvae).

Etymology.—This species is named in honor of Klaus H. Rothfels (1919–1986), the father of simuliid cytotaxonomy. In life, he successfully thwarted attempts to name a species in his honor.

Diagnosis.—Pupae of this new species are distinct from those of all other North American black flies. The four-filamented gill, with the dorsal two filaments markedly inflated and the ventral two slender, is unique. Mature larvae can be distinguished most readily by the configuration of the uncurled gill histoblast; otherwise, they resemble those of *S. johannseni* Hart, the probable sister species of *S. rothfelsi*.

Chromosomes.—The larval polytene chromosomes of *S. rothfelsi* have a haploid number of 3, with standard arm associations and the nucleolar organizer in the base of IS. These features are shared with *S. johannseni* (Golini and Rothfels 1984: 2097). Chromosomal maps of *S. johannseni* have not been published and, therefore, cannot provide further comparative information. The two male larvae that we examined had a minute inversion in the centromere region of chromosome III, suggesting that this region represents the sex-differential segment.

Biology.—The apparent scarcity of this new species is probably due largely to its remarkably narrow window of development. It is univoltine and overwinters as eggs. Larvae probably begin to hatch in early May and begin pupating within three weeks. On 3 May 2001, a large collection of simuliid larvae and pupae from the type locality revealed no specimens of the new species. By 18 May, the first mature larvae were found at the same location. In previous years, no larvae or pupae were found after 24 May. We have not found the adults. Females, like those of *S. johannseni*, probably are chiefly ornithophilic. *Simulium johannseni* is restricted to the central portion of the United States and Canada and has not been found east of Ohio. The two species, therefore, are allopatric.

The LaHave River at the type locality is more than 30 m wide, no more than 2 m

deep, with a rocky bottom, small islands, and a forested riparian zone. Larvae were collected from submerged grasses. We have found the following nine species of black flies in the LaHave River, most overlapping to some extent with the development of *S. rothfelsi*: *Prosimulium mixtum* Syme and Davies, *P. fuscum* Syme and Davies, *Stegopterna mutata* (Malloch) (diploid cytospecies), *Simulium euryadminiculum* Davies, *S. quebecense* Twinn, *S. fibrinflatum* Twinn, *S. nyssa* Stone and Snoddy, *S. vandalicum* Dyar and Shannon, and *S. venustum* Say *sensu stricto*.

Acknowledgments

We thank Ralph Idema for illustrating the larva and pupa, and J. C. Morse, J. K. Moulton, and A. G. Wheeler, Jr. for reviewing the manuscript. This study was supported in part by a grant (no. 972938) from the North Atlantic Treaty Organization to PHA and CLB. This is Technical Contribution No. 4727 from the South Carolina Agriculture and Forestry Research System.

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